## NUMERICAL:9

### CHAPPTER # 01

Exp: 1, 2, 4

**1.1**

**(a)** 5000g
$= 5\times10^{3}g$
$= 5kg$

**(b)** 2000000W
$= 2\times10^{6}W$
$= 2MW$

**(c)** $52\times10^{-10}kg$
$= 52\times10^{-10}\times10^{3}g$
$= 52\times10^{-7}g$
$= 5.2\times10^{-6}g$
$= 5.2ug$

**(d)** $225\times10^{-10}s$
$= 2.25\times10^{-6}s$
$= 2.25us$

**1.2**

$1p=10^{-12}$ / $1n=10^{-9}$
$1u=10^{-6}$ / $1u=10^{3}n$
$1n=10^{3}$ / $1u=10^{6}p$

**1.3**

بال بڑھنے کی شرح
$= V = d/t$
$= 1mm/1\ day$
$= 1\times10^{-3}/86400$
$= 1.157\times10^{-5}\times10^{-3}$
$= 1.157\times10^{-8}$
$= 11.57\times10^{-9}$
$= 11.57nm/s$

**1.4**

**(a)** $1168\times10^{-27}$
$= 1.168\times10^{-27+3}$
$= 1.168\times10^{-24}$

**(b)** $32\times10^{5}$
$= 3.2x^{5+1}$
$= 3.2\times10^{6}$

**(c)** $725\times10^{-5}kg$
$= 725\times10^{-5}\times10^{3}g$
$= 725\times10^{-2}g$
$= 7.25g$

**(d)** $0.02\times10^{-8}$
$= 2\times10^{-8-2}$
$= 2\times10^{-10}$

**1.5**

(a) 6400km
$= 6.4\times10^{3}km$

(b) 380000km
$= 3.8\times10^{5}km$

(c) 300000000m/s
$= 3\times10^{8}m/s$

(d) ایک دن میں سیکنڈ =
24x60x60s
= 86400s
$= 8.64\times10^{4}s$

**1.6**

زیرو ایرر = 0.01x4
= 0.04cm
زیرو کوریکشن = -0.04cm

**1.7**

درجوں کی تعداد = 50
سکریو کی پچ = 0.5mm
L.C = پچ/درجے
= 0.5/50
= 0.01cm

**1.8**

0.00309kg = 3
$5.05\times10^{-27} = 3$

**1.9**

1.009m = 4
0.00450kg = 3
$1.66\times10^{-27}kg = 3$
2001s = 4

**1.10**

لمبائی = 6.7cm
چوڑائی = 5.4cm
رقبہ = LxW = 6.7x5.4
$= 36.78cm^{2}$
$= 36cm^{2}$

### CHAPPTER # 02

Exp: 2,3,4,5,10,11

**2.1**

V = 36km/h
= 36x1000m/3600
V =10m/s
t = 10s
S = Vxt
=10x10
= 100m

**2.2**

$V_i = 0$
S = 1000m
t = 100s
$V_f = ?$
$S = V_it + \frac{1}{2}at^{2}$
$10^{3}=0\times100+\frac{1}{2}\times a\times(100)^{2}$
$a = 0.2m/s^{2}$
$V_f = V_i + at$
$= 0 + 0.2\times100$
$= 20m/s$

**2.3**

$V_i = 10m/s$
$a = 0.2m/s^{2}$
t = 30s
S = ?
$V_f = ?$
$V_f = V_i + at$
$= 10+0.2\times30$
$= 10+6 = 16m/s$
$S = V_it + \frac{1}{2}at$
$= 10\times30+\frac{1}{2}0.2(30)^{2}$
$= 300+\frac{1}{2}0.2\times900$
= 300+90
= 390m

**2.4**

$V_i = 30m/s$
$V_f = 0$
$g = -10m/s^{2}$
h = ?
$2gh = V_f^{2} – V_i^{2}$
$2(-10)h=(0)^{2}-(30)^{2}$
-20h = -900
h = -900/-20
h = 45m
واپسی کا ٹائم = t = 3s

**2.5**

پانچ سیکنڈ میں طے فاصلہ
$V_i = 40m/s$
t = 5s
$S_1 = Vxt$
$S_1 = 40\times5$
= 200m

دس سیکنڈ میں طے فاصلہ
$V_i = 40m/s$
$V_f = 0$
t = 10s
$V_{av} = V_f+V_i/2$
= 0+40/2
= 20m/s
$S_2 = Vxt$
$S_2 = 20\times10$
= 200m

کل فاصلہ $= S_1 + S_2$
= 200 + 200
= 400m

ڈسلریشن
$a_{av} = V_f–V_i/t$
= 0-40/10 = -40/10
$= -4m/s^{2}$

**2.6**

Vi = 0
a = 0.5m/s2
S = 100m
$V_f = ?$
$2aS = V_f^{2} – V_i^{2}$
$2(0.5)100=V_f^{2}-(0)^{2}$
$V_f^{2} = 100$
$V_f = 10m/s^{2}$
$V_f = 10\times3600/1000$
$V_f = 36km/h$

**2.7**

دو منٹ میں طے فاصلہ
$V_i = 0$
$V_f = 48km/h$
= 13.33m/s
t = 2mint=2x60
= 120s
$V_{av} = V_f-V_i/2$
= 0+13.33/2
= 6.66m/s
$S_1 = V_{av}xt$
= 6.66x120
= 800m

پانچ منٹ میں طے فاصلہ
V = 13.33m/s
t = 5mint = 5x60
= 300s
$S_2 = Vxt$
= 13.66x300
= 4000m

تین منٹ میں طے فاصلہ
$V_i = 13.66m/s$
$V_f = 0$
t = 3mint = 3x60
= 180s
$V_{av} = V_f+V_i/2$
= 0+13.66/2
= 6.66m/s
$S_3 = V_{av}xt$
= 6.66x180
= 1200m
کل فاصلہ $= S_1+S_2+S_3$
= 800+4000+1200
= 6000m

**2.8**

اوپر جانے کا وقت
t = 6/2 = 3s
$g = -10m/s^{2}$
$V_f = 0$
h = ?
$V_i = ?$
$V_f = V_i + gt$
$0 = V_i + (-10)\times3$
$V_i = 30m/s$
$2gh = V_f^{2}-V_i^{2}$
**2(-10)h=(0)2-(30)2-20xh=-900**
h = -900/-20
= 45m

**2.9**

S = 800m
$V_i = 96km/h$
= 26.67m/s
$V_f = 48km/h$
= 13.33m/s
a = ?
$2aS = V_f^{2}-V_i^{2}$
**$2a800=(13.33)^{2}-(26.67)^{2}$**
**1600a=177.68-711.28**
a = -533.6/1600
$= -0.3335m/s^{2}$

اس ایکسلریشن سے طے فاصلہ
$V_i = 13.33m/s$
$V_f = 0$
$a = -0.3335m/s^{2}$
S = ?
$2aS = V_f^{2}-V_i^{2}$
**$2(-0.3335)S=(0)^{2}-(13.33)^{2}$**
0.667xS = -177.66

S = -177.66/-0.667
S = 266.4m

**2.10**
$V_i$ = 26.67m/s
$V_f$ = 0
a = -0.3335m/s$^2$
$V_f = V_i + at$
t = Vf-Vi/a
t = 0-26.67/-0.3335
t = 80s

## CHAPPTER # 03

Exp: 1, 2, 3, 6, 7, 8

**3.1**
F = 20N
a = 2m/s$^2$
F = ma
m = F/a
= 20/2
= 10kg

**3.2**
W = 147N
g = 10m/s$^2$
W = mg
m = W/g
= 147/10
= 14.7kg

**3.3**
m = 10kg
g = 10m/s$^2$
W = mg → F
= 10x10
= 100N

**3.4**
F = 100N
m = 50kg
F = ma
a = F/m
= 100/50
= 2m/s$^2$

**3.5**
W = 20N
a = 2m/s$^2$
g = 10m/s$^2$
W = mg
m = W/g
= 20/10
= 2kg
F = ma
= 2x2 = 4N
ساری فورس = W+F
F = 20+4
= 24N

**3.6**
بڑا ماس $m_1$ = 52kg
چھوٹا ماس $m_2$ = 48kg
g = 10m/s$^2$
a = $\frac{(m_1-m_2)g}{m_1+m_2}$
=(52-48)x10/52+48
= 4x10/100=40/100
a = 0.4m/s$^2$
T = $\frac{2m_1m_2g}{m_1+m_2}$
= 2x52x48x10/100
= 49920/100
T = 500N

**3.7**
لٹکا ہوا ماس $m_1$ = 24k
سطح پر پڑا ماس $m_2$ = 26kg
g = 10m/s$^2$
a = $\frac{m_1g}{m_1+m_2}$
= 24x10/24+26
a = 240/50
= 4.8m/s$^2$
T = $\frac{m_1m_2g}{m_1+m_2}$
=24x26x10/24+26
T = 6240/50
= 125N

**3.8**
ΔP = 22Ns
F = 20N
F = ΔP/t
t = ΔP/F
= 22/20
t = 1.1s

**3.9**
m = 5kg
μ = 0.6
$F_s$ = μR = μmg
$F_s$ = 0.6x5x10
= 30N

**3.10**
m = 0.5kg
r = 50cm
r = 50/100
= 0.5m
V = 3m/s
$F_c = mV^2/r$
= 0.5x(3)$^2$/0.5
= 9N

## CHAPPTER # 04

Exp: 1, 2, 5

**4.1**
$F_x$ = 10-4 = 6N
$F_y$ = 6N
F = $\sqrt{F_x^2 + F_y^2}$
F = $\sqrt{6^2 + 6^2}$
F = $\sqrt{72}$ = 8.5N
$\theta$ = tan$^{-1}$($F_y/F_x$)
$\theta$ = tan$^{-1}$(6/6)
$\theta$ = tan$^{-1}$(1)
= 45$^0$

**4.2**
F = 50N
$\theta$ = 30$^0$
$F_x$ = Fcos $\theta$
= 50cos30$^0$
= 50x0.866
= 43.3N
$F_y$ = Fsin $\theta$
= 50sin30$^0$
= 50x0.5
= 25N

**4.3**
$F_x$ = 12N
$F_y$ = 5N
F = $\sqrt{F_x^2 + F_y^2}$
F = $\sqrt{12^2 + 5^2}$
F = $\sqrt{169}$ = 13N
$\theta$ = tan$^{-1}$($F_y/F_x$)
$\theta$ = tan$^{-1}$(5/12)
= 22.6$^0$

**4.4**
F = 100N
r = 10cm = 0.1m
τ = rF
= 0.1x100
= 10Nm

**4.5**
$F_x$ = 20N
$\theta$ = 30$^0$
$F_x$ = Fcos $\theta$
F = $F_x$/cos $\theta$
= 20/cos30$^0$
= 20/0.866
= 23.1N

**4.6**
F = 50N
r = 16cm = 0.16m
کپل کا ٹارک
τ = 2rF
= 2x0.16x50
= 16Nm

**4.7**
$T_1$ = 3.8N
$T_2$ = 4.4N
W = $T_1 + T_2$
= 3.8+4.4
= 8.2N

**4.8**
$m_1$ = 3kg
$m_2$ = 5kg
$T_1$ = mg
= 3x10
= 30N
$T_2$ = ($m_1$+$m_2$)g
= (3+5)x10
= 80N

**4.9**
$F_1$ = 200N
$r_1$ = 20cm = 0.2m
$F_2$ = 150N
$r_2$ = ?
$\tau_1 = \tau_2$
$F_1r_1 = F_2r_2$
$r_2 = F_1r_1/F_2$
= 0.1x200/150
= 0.133m
= 13.3cm

**4.10**
m = 10kg
$F_1$ = mg
$F_1$ =10x10 = 100N
$r_1$ = 20cm = 0.2m
$r_2$ = 50cm = 0.5m
$F_2$ = ?
انٹی کلاک وائز = کلاک وائز ٹارک
$F_2r_2 = F_1r_1$
$F_2 = F_1r_1/r_2$
= 100x0.2/0.5
= 20/0.5
= 40N

## CHAPPTER # 05

Exp: 1, 2

**5.1**
$m_1$ = 1000kg
$m_2$ = 1000kg
d = 0.5m
G = 6.67x10$^{-11}$Nm$^2$kg$^{-2}$
F = $Gm_1m_2/d^2$
= Gx10$^3$x10$^3$/(0.5)$^2$
=**6.67x10$^{-11}$x10$^6$/0.25**
= 26.7x10$^{-11+6}$
= 26.7x10$^{-5}$
= 2.67x10$^{-4}$ N

**5.2**
m = $m_1$ = $m_2$ =?
F = 0.006673N
d = 1m
G = 6.67x10$^{-11}$Nm$^2$kg$^{-2}$
F = $Gm_1m_2/d^2$
m$^2$ = Fxd$^2$/G
= $\frac{0.006673(1)^2}{6.673x10-11}$
= $\frac{6.673x10^{-3}}{6.673x10^{-11}}$ (6.673 struck out)
m$^2$ = 1x10$^{-3+11}$
= 10$^8$
$\sqrt{m^2}$ = $\sqrt{(10^4)^2}$
m = 10000kg

**5.3**
$M_m$ = 6.42x10$^{23}$kg
$R_m$ = 3370km
= 3.370x10$^6$m
G = 6.67x10$^{-11}$Nm$^2$kg$^{-2}$
$g_m = GM_m/R^2$
= $\frac{6.673x10^{-11}x6.42x10^{23}}{(3.370x10^6)^2}$
= $\frac{42.84x10^{23-11}}{11.35x10^{12}}$
= 3.77x10$^{12-12}$
= 3.77x10$^0$
$g_m$ = 3.77m/s$^2$

**5.4**
$g_m$ = 1.62m/s$^2$
$R_m$ = 1740km

$= 1.740\times10^{6}m$
$G = 6.67\times10^{-11}Nm^{2}kg^{-2}$
$M_m = g_mR^2/G$
$= \frac{1.62\times(1.74\times10^6)^2}{6.673\times10^{-11}}$
$= \frac{1.62\times3.027\times10^{12}}{6.673\times10^{-11}}$
$= \frac{4.904712\times10^{12+11}}{6.673}$
$= 0.735\times10^{23}$
$M_m = 7.35\times10^{22}kg$

**5.5**
$h = 3600km$
$= 3.6\times10^6m$
$R = 6.4\times10^6m$
$M_e = 6\times10^{24}kg$
$g_m = GM/(R+h)^2$
$= \frac{6.67\times10^{-11}\times6\times10^{24}}{(6.4\times10^6+3.6\times10^6)^2}$
$= \frac{40.038\times10^{24-11}}{[(6.4+3.6)\times10^6]^2}$
$= \frac{40.038\times10^{13}}{(10\times10^6)^2}$
$= \frac{40.038\times10^{13}}{100\times10^{12}}$
$= 0.4\times10^{13-12}$
$= 0.4\times10^{1}$
$g_m = 4m/s^2$

**5.6**
$R = 48700km$
$= 48.7\times10^6m$
$g = GM/R^2$
$= \frac{6.67\times10^{-11}\times6\times10^{24}}{(48.7\times10^6)^2}$
$= \frac{40.038\times10^{24-11}}{2371.69\times10^{12}}$
$= 0.017\times10^{13-11}$
$= 0.017\times10^{1}$
$g = 0.17m/s^2$

**5.7**
$R = 10000km$
$= 10^7m$
$g = 4m/s^2$
$M_e = gR^2/G$
$= \frac{4\times(10^7)^2}{6.67\times10^{-11}}$
$= 0.599\times10^{14+11}$
$= 0.599\times10^{25}$
$M = 5.99\times10^{24}kg$

**5.8**
$g_h = ¼\ g$
$g_h = GM/(R+h)^2$
$(R+h)^2 = GM/g_h$
$= GM/\ ¼\ g$
$(R+h)^2 = 4GM/g$
دونوں طرف جذر لی
$\sqrt{(R+h)^2} = \sqrt{4GM/g}$
$R+h = \sqrt{4R^2}$
$R+h = 2R$
$h = 2R-R$
$h = R$

**5.9**
$h = 850km$
$h = 0.85\times10^6m$
$V_0 = (GM/R+h)^{1/2}$
$= \frac{(6.673\times10^{-11}\times6\times10^{24})^{1/2}}{(0.85\times10^6+6.4\times10^6)^{1/2}}$
$= \frac{(40.038\times10^{13})^{1/2}}{[(0.85+6.4)10^6]^{1/2}}$
$= \left(\frac{40.038\times10^{13-6}}{7.25}\right)^{1/2}$
$= (5.522\times10^7)^{1/2}$
$= (55.22\times10^6)^{1/2}$
$= 7.431\times10^3$
$V_0 = 7431m/s$

**5.10**
$h = 42000km$
$= 42\times10^6m$
$V_0 = (GM/R+h)^{1/2}$
$= \frac{(6.673\times10^{-11}\times6\times10^{24})^{1/2}}{(42\times10^6+6.4\times10^6)^{1/2}}$
$= \frac{(40.038\times10^{24-11})^{1/2}}{[(42+6.4)10^6]^{1/2}}$
$= \left(\frac{40.038\times10^{13-6}}{48.4}\right)^{1/2}$
$= (0.8272\times10^7)^{1/2}$
$= (8.272\times10^6)^{1/2}$
$= 2.876\times10^3$
$V_0 = 2876m/s$

## CHAPPTER # 06

Exp: 1, 2, 3, 4, 5

**6.1**
$F = 300N$
$d = 35m$
$W = Fd$
$= 300\times35$
$= 10500J$

**6.2**
$W = mg = 20N$
$h = 6m$
$P.E = mgh$
$= 20\times6$
$= 120J$

**6.3**
$W = 12kN$
$= 12000N$
$V = 20m/s$
$W = mg$
$m = W/g$
$= 12000/10$
$= 1200kg$
$K.E = ½mV^2$
$= ½\times1200\times(20)^2$
$= 600\times400$
$= 240000$
$= 240\times10^3$
$= 240kJ$

**6.4**
$m = 500g$
$= 0.5kg$
$V = 15m/s$
$K.E = ½mV^2$
$= ½\times500\times(0.5)^2$
$= 0.5\times225/2$
$K.E = 56.25J$
کنزرویشن آف انرجی کے قانون کے مطابق
$K.E = P.E$
$P.E = 56.25J$

**6.5**
$h = 6m$
$V = 1.5m/s$
$m = 40kg$
$P.E = mgh$
$= 40\times10\times6$
$= 2400J$
$K.E = ½mV^2$
$= ½\ 40\times(1.5)^2$
$= 20\times2.25$
$= 45J$

**6.6**
$V = 4m/s$
$F = 4000N$
$P = W/t = F.d/t$
$P = F.V$
$= 4000\times4$
$= 16000W$
$= 16kW$

**6.7**
$F = 300N$
$d = 50m$
$t = 60s$
$P = W/t = F.d/t$
$P = 300\times50/60$
$= 250W$

**6.8**
$m = 50kg$
$t = 20s$
سیڑھی کی لمبائی $= 16cm$
$= 16/100 = 0.16m$
سیڑھیوں کی تعداد $= 25$
$h = 25\times0.16 = 4m$
$P = W/t = mgh/t$
$= 50\times10\times4/20$
$= 100W$

**6.9**
$m = 200kg$
$h = 6m$
$t = 10s$
$P = W/t = mgh/t$
$= 200\times10\times6/10$
$= 1200W$

**6.10**
$m = 800kg$
$P = 1hp = 746W$
$t = 10mint = 600s$
$h = 15m$
$P = W/t$
$W = Pxt$
$= 746\times600$
$input = 447600J$
$W = mgh$
$= 800\times10\times15$
$output = 120000J$
$E_f = (output/input)100$
$= \frac{120000}{447600}\times100$
$E_f = 26.8\%$

## CHAPPTER # 07

Exp: 1, 2

**7.1**
$m = 850g$
$=850/1000=0.85kg$
$V = 40cm\times10cm\times5cm$
$= \frac{40m}{100}\times\frac{10m}{100}\times\frac{5m}{100}$
$= 0.4m\times0.1m\times0.05m$
$V = 0.002m^3$
$\rho = m/V$
$= 0.85/0.002$
$= 425kg/m^3$

**7.2**
$m = 1L = 1kg$
$\rho = 0.92kg/L$
$V = m/\rho$
$= 1/0.92 = 1.09L$

**7.3**
**(a)** $m = 5kg$
$\rho = 8200kg/m^3$
$V = m/\rho = 5/8200$
$= 6.01\times10^{-4}m^3$
**(b)** $m = 200g$
$= 200/1000 = 0.2kg$
$\rho = 11300kg/m^3$
$V = m/\rho=0.2/11300$
$= 1.77\times10^{-5}m^3$
**(c)** $m = 0.2kg$
$\rho = 19300kg/m^3$
$V = m/\rho=0.2/19300$
$= 1.04\times10^{-5}m^3$

**7.4**
$\rho = 1.3kg/m^3$
$V = 8m\times5m\times4m$
$= 160m^3$
$m = \rho\times V$
$= 160\times1.3$
$= 208kg$

**7.5**
$F = 75N$
$A = 1.5cm^2$
$(1m)^2 = (100cm)^2$
$1/10^4m^2 = 1cm^2$
$1.5cm^2=0.00015m^2$
$P = F/A$
$= 75/0.00015$
$= 5\times10^5Pa$

**7.6**
$L = 10mm$
$= 10/1000 = 0.01m$
$A = L\times L=0.01\times0.01$
$= 1\times10^{-4}m^2$

$F = 20N$
$P = F/A = 20/10^{-4}$
$= 2x10^5 N/m^2$

$m=1000g=1kg$ **7.7**
$A = 7.5cm \times 7.5cm$
$= \frac{7.5m}{100} \times \frac{7.5m}{100}$
$= 0.075m \times 0.075m$
$A = 0.005625m^2$
$F = mg$
$= 1x10 = 10N$
$P = F/A$
$= 10/0.005625$
$= 1778N/m^2$

$V = \frac{20cm}{100} \times \frac{7.5cm}{100} \times \frac{7.5cm}{100}$
$= 0.2m \times 0.075m \times 0.075m$
$V = 0.001125m^3$
$\rho = m/V$
$= 1/0.001125$
$= 888.89kg/m^3$

کیوب کے ماس اور ڈینسٹی کے لحاظ سے
اس کا اصل والیوم **7.8**
$m = 306g$
$\rho = 2.55g/cm^3$
$V_0 = m/\rho$
$= 306/2.55$
$= 120cm^3$
کیوب کی شکل کی وجہ سے اس کا والیوم
$V_s = 5x5x5 = 125cm^3$
کیویٹی کا والیوم $= V_c = V_s - V_o$
$V_c = 125-120 = 5cm^3$

$W_{air} = 18N$ **7.9**
$W_{water} = 11.4N$
$D = (W_{air}/W_{air}-W_{wat})\rho$
$D = (18/6.6)x1000$
$= 2727kg/m^3$ **(Al)**

$W = 3.06N$ **7.10**
$m = W/g = 3.06/10$
$= 0.306kg = 306g$
$\rho = 0.6g/cm^3$
**(a)** $V = m/\rho$
$= 306/0.6 = 510cm^3$
**(b)** $V = m/\rho$
$= 306/0.9 = 340cm^3$

$F_2 = 20000N$ **7.11**
پریس کے پسٹن کا ایریا
$D = 30cm$
$R = D/2 = 30/2$
$= 15cm = 0.15m$
$A = \pi R^2$
$= 3.14x(0.15)^2$
$= 0.07065m^2$
پمپ کے پسٹن کا ایریا
$d = 3cm$
$r = d/2 = 3/2$
$= 1.5cm = 0.015m^2$
$a = \pi r^2$
$= 3.14x(0.015)^2$
$= 0.0007065m^2$
$F_2/A = F_1/a$
$F_1 = F_2 xa/A$
$= \frac{20000x0.0007065}{0.07065}$
$F_1 = 14.13/0.07065$
$F_1 = 200N$

$A = 2x10^{-5}m^2$ **7.12**
$F = 4000N$
اصل لمبائی $= L = 2m$
$\Delta L = 2mm$
$= 2/1000 = 0.002m$
$Y = FxL/Ax\Delta L$
$= 4000x2/2x10^{-5}x.002$
$= 8000/4x10^{-8}$
$Y = 2x10^{11}N/m^2$

## CHAPPTER # 08

Exp: 1, 2, 3, 4

$C = 50^0C$ **8.1**
$F = 1.8^0C+32$
$= 1.8x50+32$
$F = 122^0F$

$F = 98.6^0F$ **8.2**
$C = (F-32)/1.8$
$= (98.6-32)/1.8$
$= 37^0C$
$K = C+273$
$= 37+273$
$= 310K$

$L_0 = 2m$ **8.3**
$T_1 = 0^0C = 273K$
$T_2 = 20^0C = 293K$
$\alpha = 2.5x10^{-5}K^{-1}$
$\Delta L = \alpha L_0(T_2-T_1)$
$= 2.5x10^{-5}x2(293-273$
$= 2.5x10^{-5}x2(20)$
$= 2.5x40x10^{-5}$
$= 100/10^5$
$= 0.001m = 0.1cm$

$V_0 = 1.2m^3$ **8.4**
$T_1 = 15^0C = 288K$
$T_2 = 40^0C = 313K$
$\beta = 3.67x10^{-3}K^{-1}$
$V = V_0(1+\beta\Delta T)$
$= 1.2[1+3.67x10^{-3}(313-288)]$
$= 1.2[1+3.67x10^{-3}(25)]$
$= 1.2[1+0.09175]$
$V = 1.3m^3$

$m = 0.5kg$ **8.5**
$T_1 = 10^0C = 283K$
$T_2 = 65^0C = 338K$
$C = 4200J/kgK$
$\Delta Q = Cm\Delta T$
$= 0.5x4200(338-283)$
$= 05x4200x55$
$\Delta Q = 115500J$

$\Delta Q = 1000J/s$ **8.6**
$m = 200g = 0.2kg$
$T_1 = 20^0C = 293K$
$T_2 = 90^0C = 363K$
$Q = Cm\Delta T/t$
$t = 4200x0.2(363-293)/Q$
$t = 840(70)/1000$
$t = 58800/1000$
$t = 58.8s$

$\Delta Q = 50000J$ **8.7**
$H_f = 336000J/kg$
$\Delta Q = H_f m$
$m = \Delta Q/H_f$
$m = 50000/336000$
$= 0.149kg$
$= 150g$

$m=100g=0.1kg$ **8.8**
برف کو گرم کرنے کے لیے درکار حرارت
$Q_1 = Cm\Delta T$ $(-10 \rightarrow 0)$
$= 2100x0.1[0-(-10)]$
$Q_1 = 2100J$
برف کو پگھلانے کے لیے درکار حرارت
$Q_2 = mH_f$ (@ $0^0C$)
$= 0.1x336000$
$Q_2 = 33600J$
پانی کو گرم کرنے کے لیے درکار حرارت
$Q_3 = Cm\Delta T$ $(0 \rightarrow 10)$
$= 4200x0.1(10-0)$
$Q_3 = 4200J$
کل حرارت $= Q_1+Q_2+Q_3$
$= 2100+33600+4200$
$Q = 39900J$

$T = 100^0C$ **8.9**
$m = 100g = 0.1kg$
$H_v = 2.26xx10^6J/kg$
$\Delta Q = mH_v$
$= 0.1x2.26x10^6$
$= 2.26x10^5J$

$m_{steam} = 5g$ **8.10**
$= 5/1000 = 0.005kg$
$m_{water} = 500g$
$= 500/1000 = 0.5kg$
پانی کی پہلے ٹمپریچر سے آخری ٹمپریچر تک اپنے ماس کے لحاظ سے جذب کردہ حرارت
$Q_p = Cm\Delta T$
$= Cm(T_2-T_1)$
$= 2100x0.5(T_2-10)$
$= 2100T_2-21000$
ماس کے لحاظ سے بھاپ کی خارج کردہ حرارت
$Q = mH_v$
$= 0.005x2.26x10^6$
$= 11300J$
بھاپ کی پہلے ٹمپریچر سے آخری ٹمپریچر تک جاتے ہوئے خارج کردہ حرارت
$Q = Cm\Delta T$
$= 4200x0.005(100-T_2)$
$= Q = 2100-21T_2$
پانی کی جذب کردہ حرارت = بھاپ کی خارج کردہ حرارت
$2100T_2-2100=$
$11300+2100-21T_2$
$2100T_2+21T_2=$
$11300+2100+21000$
$2121T_2 = 34400$
$T_2 = 34400/2121$
$T_2 = 16.21^0C$

## CHAPPTER # 09

$A = 200m^2$ **9.1**
$L = 20cm = 0.2m$
$T_1 = 15^0C = 288K$
$T_2 = 35^0C = 308K$
$k = 0.65 W/mK$
$Q/t = kA(T_2-T_1)/L$
$= \frac{0.65x200(308-288)}{0.2}$
$= 130x(20)/0.2$
$= 13000J/s$

$A = 2x2.5 = 5m^2$ **9.2**
$L = 0.8cm = 0.008m$
$t = 1hr = 3600s$
$T_1 = 5^0C = 278K$
$T_2 = 25^0C = 298K$
$k = 0.8 W/mK$
$Q = kA(T_2-T_1)xt/L$
$= \frac{0.8x5(298-278)x3600}{0.008}$
$= 4(20)3600/0.008$
$= 288000/0.008$
$= 36000000$
$Q = 3.6x10^7J$

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## NUMERICAL:10

### CHAPPTER # 10

Exp: 1, 2, 3

**10.1**

$T = 2s$
$g_e = 10m/s$
$g_m = g_e/6$
$= 10/6$
$= 1.67m/s$
$L = ?$
$T = 2\pi\sqrt{l/g}$
$T^2 = [2\pi\sqrt{l/g}]^2$
$T^2 = 4\pi^2 x L/g$
$L = T^2 x g/4\pi^2$

زمین کے لیے لمبائی

$L = (2)^2 10/4(3.14)^2$
$= 10/9.8596$
$= 1.02m$

چاند کے لیے لمبائی

$L = (2)^2 1.67/4(3.14)^2$
$= 1.67/9.8596$
$= 0.17m$

**10.2**

$L = 0.99m$
$T = 4.9s$
$T = 2\pi\sqrt{l/g}$
$T^2 = [2\pi\sqrt{l/g}]^2$
$T^2 = 4\pi^2 x L/g$
$g = 4\pi^2 x L/T^2$
$= 4(3.14)^2 x 0.99/(4.9)^2$
$= 4(9.8596)(0.99)/24.01$
$g = 1.63m/s^2$

**10.3**

$L = 1m$
$g_e = 10m/s$
$g_m = 1.67m/s$
$T = 2\pi\sqrt{l/g}$

زمین کی سطح پر ٹائم پیریڈ

$T = 2(3.14)\sqrt{1/10}$
$= 6.28\sqrt{0.1} = 2s$

چاند کی سطح پر ٹائم پیریڈ

$T = 2(3.14)\sqrt{1/1.6}$
$= 6.28\sqrt{0.598}$
$= 4.9s$

**10.4**

$T = 2s$
$g = 10m/s^2$
$T = 2\pi\sqrt{l/g}$
$T^2 = [2\pi\sqrt{l/g}]^2$
$T^2 = 4\pi^2 x L/g$
$L = T^2 x g/4\pi^2$
$= (2)^2 x 10/4(3.14)^2$
$= 4x10/4x9.85$
$= 40/39.4$
$L = 1.02m$

**10.5**

$t = 20s$
ویوز کی تعداد $= n = 100$
$\lambda = 6cm$
$= 6/100$
$= 0.06m$
$f =$ ویوز کی تعداد/وقت
$= n/t$
$= 100/20$
$= 5Hz$
$T = 1/f$
$= 1/5$
$= 0.2s$
$V = f\lambda$
$= 5x0.06 = 0.3m/s$

**10.6**

$f = 12Hz$
$\lambda = 3cm$
$= 3/100$
$= 0.03m$
$V = f\lambda$
$= 12x0.03$
$= 0.36m/s$

**10.7**

$f = 190Hz$
$S = 90m$
$t = 0.5s$

(a) ٹائم پیریڈ

$T = 1/f$
$T = 1/190$
$= 0.005s$

(b) سپیڈ

$V = S/t$
$V = 90/0.5$
$= 180m/s$

(c) ویولینگتھ

$V = f\lambda$
$\lambda = V/f$
$\lambda = 180/190$
$= 0.95m$

**10.8**

$f = 4.8Hz$
$\lambda = 6cm$
$= 0.06m$

(a) سپیڈ

$V = f\lambda$
$V = 4.8x0.06$
$= 0.29m/s$

(b) ٹائم پیریڈ

$T = 1/f$
$T = 1/4.8$
$= 0.21s$

**10.9**

$f = 5Hz$
$\lambda = 40mm$
$= 40x10^{-3}m$
$S = 80cm$
$= 80/100$
$= 0.8m$
$V = f\lambda$
$= 5x40x10^{-3}$
$= 0.2m/s$
$S = Vt$
$t = S/V$
$= 0.8/0.2 = 4s$

**10.10**

$f = 90MHz$
$= 90x10^6Hz$
$V = 3x10^8m/s$
$V = f\lambda$
$\lambda = V/f$
$= 3x10^8/90x10^6$
$= 3.33m$

### CHAPPTER # 11

Exp: 2, 3

**11.1**

$I = 3x10^{-6}W/m^2$
$I_o = 10^{-12}W/m^2$

(a) ساؤنڈ لیول

$S.L = 10\log I/I_o (dB)$
$= 10\log(3x10^{-6}/10^{-12})$
$= 10\log(3x10^6)$
$= 10[\log3+\log10^6]$
$= 10[\log3+6\log10]$
$= 10[0.4771+6(1)]$
$= 64.771$
$= 64.8dB$

(b) انٹینسٹی

$S.L = 100dB$
$S.L = 10\log I/I_o (dB)$
$100 = 10\log I/10^{-12}$
$10 = \log I/10^{-12}$

دونوں طرف انٹی لاگ لیا

$10^{10} = I/10^{-12}$
$10^{10}x10^{-12} = I$
$10^{-2} = I$
$I = 0.01W/m^2$

**11.2**

$S.L = 80dB$
$I_o = 10^{-12}W/m^2$
$S.L = 10\log I/I_o (dB)$
$80 = 10\log I/10^{-12}$
$8 = \log I/10^{-12}$

دونوں طرف انٹی لاگ لیا

$10^8 = I/10^{-12}$
$10^8x10^{-12} = I$
$I = 10^{-4}W/m^2$

**11.3**

$V = 330m/s$
$\lambda = 5cm$
$= 5/100$
$= 0.05m$
$V = f\lambda$
$330 = f x 0.05$
$f = 330/0.05$
$= 6.6x10^3Hz$

ساؤنڈ قابل سماعت ہے

**11.4**

ویوز کی تعداد $= n = 72$
$t = 60s$

(a) فریکونسی

$f =$ ویوز کی تعداد/وقت
$f = n/t$
$= 72/60$
$= 1.2Hz$

(b) ٹائم پیریڈ

$T = 1/f$
$= 1/1.2$
$= 0.83s$

**11.5**

$T = 1.5s$
$t = 1.5/2$
$= 0.75s$
$V = 1500m/s$
$S = Vt$
$= 1500x0.75$
$= 1125m$

ٹائم صرف ایک طرف کا لیا جائے گا

**11.6**

$T = 5s$
$t = 5/2$
$= 2.5s$
$V = 346m/s$
$S = Vt$
$= 346x2.5$
$= 865m$

ٹائم صرف ایک طرف کا لیا جائے گا

**11.7**

$T = 3.42s$
$t = 3.42/2$
$= 1.71s$
$V = 1531m/s$
$S = Vt$
$= 1531x1.71$
$= 2618m$

ٹائم صرف ایک طرف کا لیا جائے گا

**11.8**

$V = 343m/s$
$f = 20000Hz$

(a) بلند ترین فریکونسی کے لیے

$V = f\lambda$
$343 = 20000 x \lambda$
$\lambda = 343/20000$

$\lambda = 1.7\times10^{-2}$m

(b) کم ترین فریکونسی کے لیے

V = fλ

343 = 20 x λ

λ = 343/20 = 17.2m

---

**11.9**

f = 2kHz

= 2000Hz

λ = 35cm

= 35/100

= 0.35m

S = 1.5km

= 1.5x1000

=1500m

V = fλ

= 2000x0.35

= 700m/s

S = Vt

t = S/V

= 1500/700

= 2.1s

---

## CHAPPTER # 12

Exp: 1, 2, 3, 4

**12.1**

p = 10cm

q = -5cm

امیج مرر کے پیچھے، اس لیے نفی آیا

$1/f = 1/p + 1/q$

= 1/10 + 1/(-5)

f = -10cm

(diverging-mirror)

---

**12.2**

HO = 30cm

p = 10.5cm

f = 16cm

$1/f = 1/p + 1/q$

1/16 = 1/10.5 + 1/q

1/q = 1/16 – 1/10.5

=(10.5-16)/16x10.5

1/q = -168/5.5

q = 30.54cm

(converging-mirror)

HI: امیج کی اونچائی

HO: جسم کی اونچائی

HI/HO = q/p

HI/30 = 30.54/10.5

HI = 87.26cm

---

**12.3**

p = 20cm

HI/HO = q/p

HI/HI = q/p

1 = q/p

q = p = 20cm

$1/f = 1/p + 1/q$

= 1/20 + 1/20

f = 10cm

---

**12.4**

p = 34.4cm

q = -5.66cm

(diverging-mirror)

$1/f = 1/p + 1/q$

= 1/34.4 + 1/(-5.66)

=(5.66-34.4)/34.4x5.66

f = -194.7/28.74

= -6.77cm

---

**12.5**

f = -13.5cm

q = -11.5cm

$1/f = 1/p + 1/q$

1/(-13.5)=1/p+1/(-11.5)

1/p = 1/11.5-1/13.5

=(13.5-11.5)/11.5x13.5

p = 155.25/2

= 77.62cm

---

**12.6**

f = -8.70cm

HO = 13.2cm

p = 19.3cm

p = 2p = 2(19.3)

= 38.4cm

$1/f = 1/p + 1/q$

1/(-8.70)=1/19.3+1/q

1/q =1/8.70+1/19.3

=(19.3-8.70)/8.70x19.3

q = 167.91/10.6

= 15.84

(b) امیج کی اونچائی

HI/HO = q/p

I/13.2 = 16.84/19.3

HI = 10.8cm

(c) امیج کی اونچائی

HI/HO = q/p

I/13.2 = 15.84/38.4

HI = 5.42cm

---

**12.7**

R = 38cm

f = R/2

= 38/2

= 19cm

p = 50cm

$1/f = 1/p + 1/q$

1/19 = 1/50 + 1/q

1/q = 1/19-1/50

= (50-19)/19x50

q = 950/31

= 30.64cm

امیج سیدھی ہوگی

---

**12.8**

HO = 4cm

p = 12cm

f = 8cm

$1/f = 1/p + 1/q$

1/8 = 1/12 + 1/q

1/q = (6-4)/48

q = 24cm

(b) امیج کی اونچائی

HI/HO = q/p

HI/4 = 24/12

HI = 8cm

امیج، رئیل، الٹی، بڑی

---

**12.9**

HO = 10cm

p = 20cm

f = -15cm

$1/f = 1/p + 1/q$

1/(-15) = 1/20 + 1/q

1/q = (-4-3)/60

q = -8.75cm

HI/HO = q/p

HI/10 = 8.75/20

HI = 4.28cm

امیج، ورچوئل، سیدھی، بڑی

---

**12.10**

f = 6cm

q/p = 3/1

q = 3p = -3p

$1/f = 1/p + 1/q$

1/6 = 1/p + 1/(-3p)

p = 4cm

---

**12.11**

$i = 35^0$

n = 1.25

(a) اینگل آف رفریکشن

n = Sini/Sinr

$1.25 = Sin35^0/ Sinr$

Sinr = 0.57/1.25

Sinr = 0.45

$r = Sin^{-1}(0.45)$

$r = 27.32^0$

(b) کریٹیکل اینگل کے لیے

n = Sinr/Sini

$1.25 = Sin90^0/SinC$

SinC = 1/1.25

SinC = 0.80

$C = Sin^{-1}(0.80)$

$= 53.13^0$

---

**12.12**

P = 5D

f = 1/P

= 1/5

= 0.2m

میٹر کو سینٹی میٹر بنایا

f = 20cm

q/p = 2/1

q = 2p

$1/f = 1/p + 1/q$

1/20 = 1/p + 1/2p

p = 30cm

---

## CHAPPTER # 13

Exp: 1, 2

**13.1**

Q = 100μC

$= 100\times10^{-6}C$

$=10^{-4}C$

$e^- = 1.6\times10^{-19}C$

Q = ne

n = Q/e

$= 10^{-4}/1.6\times10^{-19}$

$= 0.625\times10^{-4+19}$

$n = 6.25\times10^{14}$

---

**13.2**

$q_1 = 10μC$

$= 10\times10^{-6}C$

$= 10^{-5}C$

$q_2 = 5μC$

$= 5\times10^{-6}C$

r = 150cm

= 150/100

= 1.5m

$k = 9\times10^9 Nm^2/C^2$

$F = kq_1q_2/r^2$

$=\frac{9\times10^9\times10^{-5}\times5\times10^{-6}}{(1.5)^2}$

$= 45\times10^{9-5-6}/2.25$

$F = 20\times10^{-2}$

= 20/100

= 0.2N

دفع کی فورس، مثبت چارجز

---

**13.3**

F = 0.8N

r = 0.1m

$k = 9\times10^9 Nm^2/C^2$

$F = kq_1q_2/r^2$

$0.8=9\times10^9\times q^2/(0.1)^2$

$q^2 = 0.8\times0.01/9\times10^9$

$= 8\times10^{-3}/9\times10^9$

$= 0.888\times10^{-12}$

$\sqrt{q^2}=\sqrt{0.88}\times\sqrt{(10^{-6})^2}$

$q = 0.942\times10^{-6}$

$= 9.42\times10^{-7}C$

---

**13.4**

F = 0.1N

r = 5cm

= 5/100

= 0.05m

$k = 9\times10^9 Nm^2/C^2$

$F = kq_1q_2/r^2$

$q^2 = Fr^2/k$

$= 0.1\times(0.05)^2/9\times10^9$

$=0.1\times0.0025\times10^{-9}/9$

$q^2 = 2.8\times10^{-5}\times10^{-9}$

$= 2.8\times10^{-14}C$

2cm کے لیے کولمب فورس

r = 2cm

$= 2/100 = 0.02m$
$q^2 = 2.8x10^{-14}C$
$F = kq_1q_2/r^2$
$= \frac{9x10^9x2.8x10^{-14}}{(0.02)^2}$
$=(25.2/0.0004)x10^{9-14}$
$= 63000x10^{-5}$
$F = 0.63N$

**13.5**

$V = 10^4V$
$q = 100\mu C$
$= 100x10^{-6}$
$= 10^{-4}C$
$V = W/q$
$10^4 = W/10^{-4}$
$W = 10^4x10^{-4}$
$= 10^0$
$W = 1J$

**13.6**

$q = +2C$
$V_a = 100V$
$V_b = 50V$
$W = q(V_a-V_b)$
$= 2(100-50)$
$= 100J$

**13.7**

$V = 9V$
$Q = 0.06C$
$Q = CV$
$0.06 = 9 x C$
$C = 0.06/9$
$= 6.67x10^{-3}F$

**13.8**

$Q_1 = 0.03C$
$V_1 = 6V$
$Q_2 = 2C$
مختلف ڈیٹا کے لیے بھی کیپیسی ٹینس وہی رہے گی کیونکہ کیپسٹر ایک ہی ہے
$C = C$
$Q_1/V_1 = Q_2/V_2$
$V_2 = Q_2xV_1/Q_1$
$= 2x6/0.03$
$= 400V$

13.9

$C_1 = 6\mu C$
$C_2 = 12\mu C$
$V = 12V$
$1/C_{eq} = 1/C_1 + 1/C_2$
$= 1/6 + 1/12$
$= 4\mu C$
سیریز میں تمام کیپیسٹرز پر چارج ایک جیسا ہوگا
$Q = C_{eq}V$
$= 4x10^{-6}x12$
$= 48x10^{-6}$
$= 48\mu C$
$V_1 = Q/C_1$
$= 48x10^{-6}/6x10^{-6}$
$= 8V$
$V_2 = Q/C_2$
$= 48x10^{-6}/12x10^{-6}$
$= 4V$

13.10

$C_1 = 6\mu C$
$C_2 = 12\mu C$
$V = 12V$
$C_{eq} = C_1 + C_2$
$= 6+12$
$= 18\mu F$
پیرالل میں ہر کپیسٹرز پر پوٹینشل ایک جیسا ہوگا
$p.d = 12V$
$Q_1 = C_1V$
$= 6\mu x12$
$= 72\mu C$
$Q_2 = C_2V$
$= 12\mu x12$
$= 144\mu C$

## CHAPPTER # 14

Exp: 1, 2, 6, 7

**14.1**

$I = 3mA$
$= 3x10^{-3}A$
$t = 1mints$
$= 60s$
$I = Q/t$
$3x10^{-3} = Q/60$
$Q = 60x3x10^{-3}$
$= 180x10^{-3}C$

**14.2**

**(a)** خشک جلد سے کرنٹ
$R = 100000\Omega$
$V = 12V$
$V = IR$
$12 = I x 10^5$
$I = 12/10^5$
$= 1.2x10^{-4}A$
**(b)** گیلی جلد سے کرنٹ
$R = 1000\Omega$
$V = 12V$
$V = IR$
$12 = I x 1000$
$I = 12/1000$
$= 1.2x10^{-2}A$

**14.3**

$R = 10M\Omega$
$= 10x10^6\Omega$
$V = 100V$
$V = IR$
$100 = I x 10^7$
$I = 100/10^7$
$= 1/10^5$
$= 1/10^2x10^3$
$= (1/100)x10^{-3}$
$= 0.01mA$

**14.4**

$V = 10V$
$I = 1.5A$
$t = 2mints$
$= 120s$
$R = V/I$
$= 10/1.5$
$= 6.667\Omega$
$W = I^2Rt$
$= (1.5)^2x6.667x120$
$W = 1800J$

14.5

$R_1 = 2k\Omega$
$R_2 = 8k\Omega$
$V = 10V$
**(a)** $R_e = R_1 + R_2$
$= 2+8$
$= 10k\Omega$
**(b)** سیریز میں ہر رزسٹنس پر کرنٹ ایک جیسا ہوگا
$V = IR_e$
$10 = I x 10x10^3$
$I = 1x10^{-3}$
$= 1mA$
**(c)**
$V_1 = IR_1$
$= 1x10^{-3}x2x10^3$
$= 2V$
$V_2 = IR_2$
$= 1x10^{-3}x8x10^3$
$= 8V$

14.6

$R_1 = 6k\Omega$
$R_2 = 12k\Omega$
$V = 6V$
**(a)**
$1/R_e=1/R_1+1/R_2$
$= 1/6+1/12$
$= 4k\Omega$
**(b)** پیرالل میں ہر رزسٹنس کے گرد پوٹینشل ایک جیسا ہوگا
$V = 6V$
**(c)**
$V = I_1R_1$
$6 = I_1 x 6x10^3$
$I_1 = 6/6x10^3$
$= 1mA$
$V = I_2R_2$
$6 = I_2 x 12x10^3$
$I_2 = 6/1210^3$
$= 0.5mA$

14.7

$V = 220V$
$P = 100W$
گھنٹے $= 5h$
دن $= 30$
$t = 5x30$
$= 150h$
$P = VI$
$= V(V/R)$
$P = V^2/R$
$100 = (220)^2/R$
$R = 48400/100$
$= 484\Omega$
$E = Pxhours/1000$
$= 100x150/1000$
$= 15kWh$

**14.8**

$P = 150W$
$R = 95\Omega$
$P = VI$
$= V(V/R)$
$P = V^2/R$
$150 = V^2/95$
$V^2 = 150x95$
$V^2 = 14250$
$\sqrt{V^2} = \sqrt{14250}$
$V = 120V$

14.9

10 بلبلوں کے صرف شدہ یونٹس
$P = 10x60 = 600W$
$t = 5x30 = 150h$
$E_b = Pxh/1000$
$= 600x150/1000$
$= 90kWh$
4 پنکھوں کے صرف شدہ یونٹس
$P = 4x75 = 300W$
$t = 10x30 = 300h$
$E_p = Pxh/1000$
$= 300x300/1000$
$= 90kWh$
1 ٹی وی کے صرف شدہ یونٹس
$P = 1x250 = 250W$
$t = 2x30 = 60h$
$E_t = Pxh/1000$
$= 250x60/1000$
$= 15kWh$
1 استری کے صرف شدہ یونٹس
$P =1x1000=1000W$
$t = 2x30 = 60s$
$E_i = Pxh/1000$
$= 1000x60/1000$
$= 60kWh$
$U_T = E_b+E_p+E_t+E_i$
$= 90+90+15+60$
$= 225kWh$
فی یونٹس قیمت $= Rs = 4$

بل = 4x225=1020/-

**14.10**

بلب کے لیے کرنٹ ، رزسٹنس

P = 100W
V = 250V

**(a)**

P = VI
100 = 250 x I
I = 100/250 = 0.4A

**(b)**

V = IR
250 = 0.4xR
R = 250/0.4 =625Ω

ہیٹر کے لیے کرنٹ ، رزسٹنس

P = 4kW = 4000W
V = 250V

**(a)**

P = VI
4000 = 250 x I
I = 4000/250 = 16A

**(b)**

V = IR
250 = 16xR
R = 250/16 =15.6Ω

**14.11**

R = 5.6Ω
V = 3V
I = 0.5A

**(a)** رزسٹر کے لیے پاور

$P_r = I^2R$
$= (0.5)^2x5.6$
= 1.4W

**(b)** بیٹری کے لیے پاور

$P_b = VI$
= 3x0.5
= 1.5W

**(c)** کچھ پاور بیٹری کے اندرونی رزسٹنس کی وجہ سے ضائع ہو جاتی ہے

## CHAPPTER # 15

Exp: 1

**15.1**

$V_p = 240V$
$V_s = 12V$
$N_p = 2000$
$N_s/N_p = V_s/V_p$
$N_s/2000 = 12/240$
$N_s = 12x2000/240$
= 100

**15.2**

$N_p = 1$
$N_s = 100$ (step-up)
$V_p = 20V$
$N_s/N_p = V_s/V_p$
$100/1 = V_s/20$
$V_s = 100x20/1$
= 2000V

**15.3**

$N_p = 100$
$N_s = 1$ (step-down)
$V_p = 170V$
$I_p = 1mA = 1x10^{-3}A$
$N_s/N_p = V_s/V_p$
$1/100 = V_s/170$
$V_s = 1x170/100$
= 1.7V

ان پٹ پاور = آوٹ پٹ پاور

$V_sI_s = V_pI_p$
$1.7xI_s = 170x1x10^{-3}$
$I_s = 170x10^{-3}/1.7$
= 0.1A

**15.4**

$V_p = 240V$
$V_s = 12V$
$N_p = 4000$
$I_s = 0.4A$
$N_s/N_p = V_s/V_p$
$N_s/4000 = 12/240$
$N_s = 12x4000/240$
= 200

ان پٹ پاور = آوٹ پٹ پاور

$V_sI_s = V_pI_p$
$12x0.4 = 240xI_p$
$I_p = 12x0.4/240$
= 0.02A

**15.5**

P = 500MW
$= 500x10^6W$
V = 250kV
$= 250x10^3V$
P = VI
$500x10^6=250x10^3I$
$I=500x10^6/250x10^3$
$= 2x10^3A$

**15.6**

$P_{gen} = 150kW$
$= 150x10^3W$
$V_{wire} = 10000V$
R = 2Ω
S = 5km
= 5000m

تار میں پاور جنریٹر کی وجہ سے

$P_{gen} = P_{wire}$
$150x10^3 = V_wI_w$
$150x10^3=10000x I_w$
$I_w = 150x10^3/10000$
= 15A

تار میں ضائع ہونے والا وولٹیج یا وولٹیج ڈراپ

$V_d = I_w R$
= 15x2 = 30V

تار میں ضائع ہونے والی پاور

$P_{loss} = V_d I_w$
= 30x15 = 450W

شہر کے ٹرانسفارمر کو تار سے جو وولٹیج ملا

$V_T = V_{in} - V_d$
= 10000 – 30
= 9970V

## CHAPPTER # 18

Exp: 1, 2, 4

**18.1**

$T_{1/2} = 7.3s$

آخری ہاف لائف تک دیا گیا عرصہ

$T_p = 29.2s$
$T_p = nT_{1/2}$
29.2 = n x 7.3
n = 29.2/7.3 = 4
$N = N_0/2^n$
$= N_0/2^4$
$= N_0/16$

سولہ واں حصہ باقی رہ جائے گا

**18.2**

$T_{1/2} = 5.25Y$
$T_p = 26Y$
$T_p = nT_{1/2}$
26 = n x 5.25
n = 26/5.25 = 5
$N = N_0/2^n$
$= N_0/2^5$
$= N_0/32$

بتیس واں حصہ باقی رہ جائے گا

**18.3**

$T_{1/2} = 5730Y$
اصل مقدار $= N_0$
باقی مقدار $= N = N_0/8$
$N = N_0/2^n$
$N_0/8 = N_0/2^n$
$1/2^3 = 1/2^n$
$2^3 = 2^n$
n = 3
$T_p = nT_{1/2}$
= 3 x 5730
= 17190
$= 1.7x10^4Y$

**18.4**

$T_{1/2} = 6h$
$T_p = 36h$
$T_p = nT_{1/2}$
36 = n x 6
n = 36/6 = 6
اصل مقدار $= N_0$
= 200mg
باقی مقدار = N
$N = N_0/2^n$
$= 200/2^6$
= 200/64
= 3.12mg

**18.5**

$T_{1/2} = 10mint$
اصل مقدار $= N_0$
= 368c/m
باقی مقدار = N = 23c/m
$N = N_0/2^n$
$23 = 368/2^n$
$2^n = 368/23$
$2^n = 16$
$2^n = 2^4$
n = 4
$T_p = nT_{1/2}$
= 4 x 10
= 40mint

دو ہاف لائف کے بعد

**18.6**

$T_p = 4mint$
$T_p = nT_{1/2}$
$4 = 2 x T_{1/2}$
$T_{1/2} = 4/2 = 2mint$

**18.7**

$T_{1/2} = 1500Y$
اصل مقدار $= N_0$
= 32000c/m
باقی مقدار $= N = N_0/16$
$N = N_0/2^n$
$N_0/16 = N_0/2^n$
$16 = 2^n$
$2^4 = 2^n$
n = 4
$T_p = nT_{1/2}$
= 4 x 1500
= 6000Y

**18.8**

$T_{1/2} = 4000Y$
t = 8h
C.R =310,300,280, 270,312,305,290

کاونٹ ریٹ میں بے ترتیبی ظاہر کرتی ہے کہ اس کی ہاف لائف چار ہزار بہت زیادہ ہے اور مشاہدہ کا ٹائم آٹھ گھنٹے بہت کم ہے

**18.9**

اصل مقدار $= N_0$
باقی مقدار $= N = N_0/8$
$T_{1/2} = 5730Y$
$N = N_0/2^n$
$N_0/8 = N_0/2^n$
$1/8 = 1/2^n$
$8 = 2^n$
n = 3
$T_p = nT_{1/2}$
= 3 x 5730
= 17190Y